

### **REMARKS**

Reconsideration is respectfully requested in light of the foregoing amendments and remarks which follow.

Claims 7, 8 and 15-20 are now pending. Claims 13 and 14, indicated by the Examiner as allowable if written in independent form, have been rewritten as claims 19 and 20 respectfully.

Applicants have enclosed the allowed European counterpart application- EP1236773B1 for completeness. The English translation of the patent claims appears on pages 17-20. The claims differ from those currently before the Examiner in terms of the breadth of the surface modifying agents and the breadth of the aerosol-doped pyrogenically produced oxides.

#### **References relied upon by the Examiner**

None of the primary references generically teach a hydrophobized reinforcing filler comprised of doped pyrogenically produced metal oxide. None of the primary references are directed reinforcing filler applications. Issues are presented as to what a fair reading of the reference should be. Also, since none of the primary references teach a silanized product, it is not a "long stretch of faith" to assume that a silanization method would not be taught in them. There are also clear issues as to what a more productive phrasing of the rejection statement would be.

A short synopsis of the references follows.

Mangold et al. (JP 2000-169) (Applicants have relied upon U.S. Application No. 2003/0185739, which corresponds to US 6,238,944) shows a pyrogenically produced silicon dioxide doped with aluminum oxide by means of an aerosol by introducing an aqueous aerosol of an aluminum salt into the flame of a pyrogenic silica producing flame hydrolysis method or a flame oxidation method. The product is especially suited for use in the production of inkjet paper or inkjet films due to its hydrophilic character. Paragraph [0015] states other uses for the hydrophilic product. The inkjet utility, mentioned in paragraph [0015], is described in paragraph [0017] and then exemplified and more fully described in the specification of the published application relied upon by Applicants for presenting their arguments. The detail provided would minimize the experimentation one skilled in the art would have to engage in to practice the inkjet

application. The reinforcing filler application is not provided in the same detail.

The doping component may be a metal and/or non-metal or an oxide and/or a salt of a metal and/or a non-metal. The BET surface area of the doped oxide may be between 5 and 600 m<sup>2</sup>/g. The doped pyrogenically prepared oxides of metals and/or non-metals are prepared by adding an aerosol which contains an aqueous solution of a metal and/or non-metal to the gas mixture during the flame hydrolysis of vaporizable compounds of metals and/or non-metals. There is no mention of hydrophobic surfaces. There is no mention of a silanization process. The use of potassium and cerium salts as dopants are exemplified. See examples 2, 4 and 5, respectively. Experimental conditions are summarized in Table 1. Analytical data is summarized in Table 2.

Wypych (Chapter 6 of the Handbook of Fillers, second edition) is a general text dealing with fillers. The Examiner's description of the content relied upon is accurate.

Herzig (US 4,101,499) teaches a process for the homogeneous distribution of highly dispersed active fillers with a BET surface area of at least 50m<sup>2</sup>/g in polyorganosiloxanes. The silica surface is modified with organosilicon compounds, e.g. hexamethyldisilane. See col.4 and 5. The fillers include pyrogenic silica, aluminum oxide and titanium oxide. The use or need dopants is not mentioned.

Penneck (US 4,001,128) teaches a filler system for polymers which provides high voltage insulation. The filler system utilizes a combination of alumina trihydrate and a chemically treated silica fiber. The chemically treated fillers are prepared by treating inorganic silicon containing filler with one or more silanes, e.g. octamethyl tetracyclosiloxane. See col. 2 and 3. A monolayer is formed. Porosity is reduced or eliminated. AEROSIL R972 is mentioned. Again, the use or need for dopants is not mentioned.

Guy et al. (US 4,866,661) teach a heat-vulcanized silicon dosage form. The composition makes it possible to distribute (release) a controlled and measured amount of iodine to treat deficiencies. See col. 2. Reinforcing silica fillers are taught. For the purposes of the patent the silicas can be incorporate as such or treated with silanes prior to incorporation. Pyrogenic silica is mentioned See col. 8.

Hemme et al. (US 2002/0018741) teach a pyrogenically produced titanium dioxide doped by means of an aerosol. The dopants include, aluminum oxide, platinum oxide, magnesium oxide, and zinc oxide. Titanium oxide is used as a photocatalyst or UV absorber. There is no mention of surface modification treatment to render a hydrophilic surface hydrophobic. There is mention of a use in plastics or coatings. See paragraphs [0023] and [0024]. The exemplified uses are in aqueous or acidic environments.

Mangold et al. (US 6,328,944 ('944)) is based on application No. 08/982,369. Published application US 2002/0035950 A1 is a division of application No. 08/982,369. The content is described above.

Lentz (US 3,122,520) teaches silanization of silica prior to use as a reinforcing filler silicone rubber. The preparatory process is taught in the Examples and in col. 2-3.<sup>1</sup> The essential steps appears to be heating a silica hydrosol under strong acid conditions (pH 0, .3, 1.7) prior to reacting the gel with the organosilicon compound.

Barthel et al. (US 5,851,715) describes a process for the silylation of very finely divided inorganic oxides where very finely divided inorganic oxides are treated with at least one silylating agent which is relatively nonvolatile in the temperature range of the overall process, with the proviso that the relatively nonvolatile silylating agent is admixed with the very finely divided inorganic oxides as a liquid, in the form of a very finely atomized aerosol. A highly apolar, pyrogenic silica results. Barthel et al. describes the use of an inert gas blanket in their process to reduce ignition capability of their silyating agents.

Kennan et al. (US 5,008,305) teach a reinforcing silica filler produced by treating a reinforcing silica, having a surface area of greater than 50 m<sup>2</sup>/g and from 0.5 to 6 parts by weight of adsorbed moisture per 100 parts by weight of silica, with a volatile treating agent. The reinforcing silica filler can be combined with polydiorganosiloxane and curing agent to form elastomer compositions. Kennan et al. show in Example 1 the use of a nitrogen purge to remove evolved methanol and to form an inert atmosphere to remove the possibility of an explosive

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<sup>1</sup> The silanized silica increase tensile strength. An operable surface area range for the silica is taught. See col.2 and 3. Fume silicas are mentioned. Suitable organosilanes are taught in col. 4.

mixture.

Kobayashi et al. (US 4,849,022) teach finely divided silica treated with two types of organosilican compounds having specified formula. The product has a high degree of surface treatment, which results in elevated thixotropy when mixed with organopolysiloxane, and provides stability in long-term storage. Kobayashi et al. show in connection with their process involving a specific mixture of organosilican compounds mixing at one temperature and a heat treatment step at another.

### **Product claims**

#### Claims 15, 8 and 17

Claim 15, the independent product claim, describes a rapid dissolving reinforcing filler composition. The preamble specifies the composition use and would include any materials associated with that use and the body of the claim specifies a functional amount. The patentability inquiry reflected in the Office Action(s), has focused only on the surface-modified, aerosol doped-pyrogenically produced oxides, specifically, the silanization of aerosol doped-pyrogenically produced metal or metalloid oxides as defined in claim 15. The dopants considered have as metal components: cerium, aluminum, potassium. These metals are either free metals, salts or oxides. The claimed pyrogenically produced oxides include: SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, B<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, In<sub>2</sub>O<sub>3</sub>, ZnO, Fe<sub>2</sub>O<sub>3</sub>, Nb<sub>2</sub>O<sub>5</sub>, V<sub>2</sub>O<sub>5</sub>, WO<sub>3</sub>, SnO<sub>2</sub> and GeO<sub>2</sub>. Silanization has been considered in the context of the selection and use of: octyltrimethoxysilane (Si 108), hexamethyldisilazane (HMDS), polydimethylsiloxane (PDMS) and  $\gamma$ -aminopropyltriethoxysilane (AMEO). Claim 17 further limits claim 15 by specifying the dopant metal as potassium and the pyrogenically produced oxide as silica. Claim 8 further limits claim 15 by specifying the silanizing agent as octyltrimethoxy silane.

The advantages for the claimed product are described in the final paragraph on page 13-able to be worked into organic systems, e.g. polyester resins, more rapidly and in higher concentrations. A Rule 132 Declaration, previously submitted, provides a comparison between the claimed surface-modified, aerosol doped-pyrogenically produced oxides and the doped-pyrogenically produced oxides. See Table 5 on page 7 of the Declaration. Also the declaration

describes unexpected properties.<sup>2</sup> See Table 6 and discussion which follows on pages 7 and 8.

### **Rejections**

Claims 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al. (JP 2000-169132) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661). Applicants respectfully traverse.

The Examiner critiques Applicants arguments relative to the appropriateness of the selection of Mangold et al. as the primary reference. Applicants believe that the reference should be fairly read for what it actually teaches.

The Mangold et al. product is hydrophilic pyrogenically produced silica which is doped with aluminum oxide using an aerosol. There is no suggestion or teaching of silanization. There is no suggestion or teaching of a need for silanization.

To arrive at the product as now claimed one must modify, the Mangold product so that it has a hydrophobic surface. One must select one of the three silanizing agents to do this. There is no motivation to do this. In fact, there is a suggestion not to do this since a fair reading of the Mangold reference suggests a hydrophilic surface is desired. Also there is no guidance which would lead one to select. The selections are critical to the results shown in the specification and in the Rule 132 declaration.

The declarant, a co-inventor and a person skilled in the art, of the Rule 132 Declaration shows through experiment and expert commentary the advantages of the invention which he deems to be unexpected. The Examiner's dissatisfaction with the showings presented and the

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<sup>2</sup> The Examiner suggests the results would be expected and cites six patents in support of this.<sup>2</sup> None of the documents mention doped, surface modified pyrogenically produced oxides. The documents do not establish a structure activity correlation. The documents are so dissimilar that one would be hard pressed to correlate the inherent presence of a property. Therefore, their probative value is not clear without more explanation. The patents merely show the existence of certain traits. Caradori et al. (US 6,288,1430) show "tear resistance". Eguchi et al (US 5,739,199) show an optically transparent organosiloxane resin composition. Bergstrom et al. (US 6,384,125) show improvements in tear resistance. Burns (US 6,051,672) show improvements in aggregation. Canpont (US 6,462,104) shows improvements in tear strength. Lutz et al. (4,344,800) show improvement in tear resistance and tensile strengths. None deal with a doped metal oxide with or without a silane modified surface.

commentary are not entirely appreciated. The specification along with the declaration do demonstrate advantages for the silanized product in comparison to the nonsilanized product in terms of use as a filler.

Also, relative to the claims, the Examiner ignores certain claim limitations, e.g. “amounts”, and “rapidly dissolving reinforcing filler composition”. The Mangold et al. product does not inherently possess these properties. The claimed product possesses a silanized surface. Mangold et al. desire a hydrophilic surface.

Also, there is a reference combinability issue when the references are fairly read. The primary reference does not desire an hydrophobic surface while the secondary references do. Also, there is no problem apparent in the primary reference that suggests a need for the solutions taught in any one of the secondary references. The secondary references do teach reactions where hydroxyl groups on a silica surface are reacted with silane coupling agents thereby causing a hydrophobic surface to be formed. The references appear to have been assembled relying on Applicants’ specification as a teaching.

Accordingly, for one or more of the reasons set forth above a proper prima facie case has not been established.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hemme et al. (US 2002/001871) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661). Applicants respectfully traverse.

Hemme et al. is no better a selection as a primary reference than Mangold et al., above. A reinforcing filler is not taught. There is no mention of the need for surface modification treatment to render a hydrophilic surface hydrophobic. The exemplified uses are in aqueous or acidic environments.

The Examiner suggests that it would have been obvious to silanized the surface of the Hemme et al. product. The motivation to do so is not evident. Why would one desire to create a silane barrier between the catalyst and its substrate?

Further, it is not seen why the references would be combined. There is no problem evident in the primary reference which would suggest the need of a the teachings of the secondary references e.g. directed to silanization.

Further, if the claims are fully considered they require the selection of specific surface modifying agents. There is no guidance provided for these selections. The selections are critical when one considers the results shown in the specification and in the Rule 132 declaration.

Accordingly, the teachings of the references, taken alone or in combination, are incomplete to suggest the invention as claimed. A proper prima facie case of obviousness has not been established. Withdrawal of the rejection is respectfully requested.

Claims 8, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al.(US 6,328,944 ('944)) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661). Applicants respectfully traverse.

The content of the '944 Patent relied upon here is similar to that discussed above. The deficiencies, accordingly, are the also same. These deficiencies are not remedied by the secondary references also for the reasons given above.

With regard to product claim 17, which is more closely directed to the reactants employed in the previously submitted Rule 132 Declaration, there are some additional selections that need to be made- silane surface modification, silica as the metalloid oxide and potassium as the dopant. Further, in considering the propriety of the prima facie case, the unexpected results should be considered. The relevancy of the patents cited by the Examiner relative to the unexpected nature of the results achieved is discussed above.

Since a proper prima facie case has not been established or is rebutted, considering the evidence provided within the specification and/or Rule 132 declaration, withdrawal of the rejection is respectfully requested.

**Method claims**

Claims 16, 8 and 7

Claim 16 describes a method for producing an aerosol doped, surface-modified pyrogenically produced oxides where 1) an aerosol doped-pyrogenically produced oxides is placed in a suitable mixing container, 2) the oxides are sprayed with water and/or acid and then 3) the water and/or acid treated oxides are sprayed under intensive mixing conditions where oxygen is excluded with the surface-modification reagent or a mixture of several surface-modification reagents to form the aerosol doped, surface-modified, pyrogenically produced oxides. The surface modification reagent or a mixture of several surface-modification reagents are limited to octyltrimethoxysilane (Si 108), hexamethyldisilazane (HMDS), polydimethylsiloxane (PDMS),  $\gamma$ -aminopropyltriethoxysilane (AMEO) and their mixtures. Claim 7 further limits claim 16 by including the additional steps of re-mixing the surface modification agent(s) and the aerosol doped, surface-modified, pyrogenically produced oxides for 15 to 30 minutes and tempering at a temperature of 100 to 400°C for a period of 1 to 6 hours. Claim 18 further limits claim 16 by specifying the dopant as potassium and the pyrogenically produced oxide as silica.

Claim 7 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al. (JP 2000-169132) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661) and also in view of Lentz (US 3,122,520), and Barthel et al. (US 5,851,715) and/or Kennan et al. (US 5,008,305). Applicants respectfully traverse.

Kobayashi et al. (US 4,849,022) is discussed in the body of the rejection but not in the rejection statement. Applicants assume this was an oversight. (Applicants have relied on US 2003/0185739 as the content for JP 2000-169 since a translation was not provided. There was no objection by the Office as to this reliance. U.S. Application No. 2003/0185739 corresponds to CA 2,223,377, earlier cited and overcome, as to the method claims. The earlier presented arguments which caused withdrawal of the rejection are incorporate here by reference.)

Mangold et al. (JP 2000-169132), Wypych (Chapter 6 of the Handbook of Fillers, second



edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661) are discussed above. None of these references teach a series of steps like those required by claim 16. None of these references teach the material to be treated.<sup>3</sup>

A convincing rational as to how one would arrive at the process as claimed is not evident from the Office Action. There is just a collection of teachings. Further, those teaching appear incomplete when one considers the requirements of the claims. The newly cited and applied references- Barthel et al., Kennan et al. and Kobayashi et al. do not help. (It is assumed that Kobayashi et al. was to be included in the statement of rejection.) It is clear that one can not start with the Mangold silanizing process. There is none.

The new references are directed to processes distinct from that claimed. The portions of Barthel et al. and Kennan et al. cited by the Examiner are concerned with the minimization of explosive potential due to various possibilities, e.g. explosive silanizing agents, evolution of methanol, etc., by employing "inert" atmospheres at certain stages of the process.

The newly cited references do not appear to employ the claimed surface modifying agents.

Kobayashi et al. for their purposes employ a two step process- introduction of an educt to modifying agents and then heat treatment. The starting materials and surface modifying agents are different. The nature of the steps also differ, e.g. "spraying step".

If one starts with Lentz for the sake of argument, it is not seen how one arrives at the process claimed based on the assembled teachings. The essential steps of the Lentz process include heating a silica hydrosol under strong acid conditions (pH 0, .3, 1.7) prior to reacting the gel with the organosilicon compound.

Lenz does not teach the exclusion of oxygen nor a need to. Kennan et al. and Barthel et al. do not suggest the existence of a problem, e.g. methanol evolution, "explosive" reagents,

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<sup>3</sup> The aerosol doped-pyrogenically produced oxide has a BET surface area between 40 and 217 m<sup>2</sup>/g where the dopant is homogeneously distributed within the pyrogenically produced oxide. The metal component of the dopants is specified as cerium, aluminum, potassium. The dopant is further characterized as a salt or oxide. The pyrogenically prepared metal or metal oxide is SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, B<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, In<sub>2</sub>O<sub>3</sub>, ZnO, Fe<sub>2</sub>O<sub>3</sub>, Nb<sub>2</sub>O<sub>5</sub>, V<sub>2</sub>O<sub>5</sub>, WO<sub>3</sub>, SnO<sub>2</sub> or GeO<sub>2</sub>.

suggesting a need for an inert atmosphere.

The step sequence as shown in the Rule 132 declaration, previously submitted, shows beneficial properties result from the performance of the steps as claimed. The additional steps required by claim 7 are also not taught by Lenz- re-mixing step for 15 to 30 minutes and tempering at a temperature of 100 to 400°C for a period of 1 to 6 hours. Kobayashi et al. do not help in this regard. The mere teaching of an contacting step and a heat treatment step does not suggest which changes are appropriate for the Lentz process and which are not. The necessary guidance is clearly missing. Further, even if there were guidance there is no motivation.

The mentioning in Herzig of water and silane coupling agents gives does not give rise to a suggestion of the step sequence as claimed. There is no teaching of the exclusion of oxygen or air also required by the claims.

Also, the starting material for the process is not suggested by Mangold et al. Mangold clearly does not desire a hydrophobic surface.

A prima facie case of obviousness has not been established. Withdrawal of the rejection is respectfully requested.

Claims 7, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangold et al. (US 6,328,944) in view of Wypych (Chapter 6 of the Handbook of Fillers, second edition), Herzig (US 4,101,499), Penneck (US 4,001,128) and Cyprien Guy et al. (US 4,866,661) and also in view of Lentz (US 3,122,520), and Barthel et al. (US 5,851,715) and/or Kennan et al. (US 5,008,305). Applicants respectfully traverse.

U.S. Application No. 2003/0185739 corresponds to CA 2,223,377, earlier cited and overcome, as to the method claims. The earlier presented arguments are incorporate here by reference.

The content of US 6,238,944 corresponds to U.S. Application No. 2003/0185739. The deficiencies as to the claims, accordingly, would also be the same as discussed above. These deficiencies are not remedied by the secondary references also for the reasons also given above.

With regard to process claim 16, which is more closely directed to the reactants employed in the previously submitted Rule 132 Declaration, there are additional selections that need to be made- silane surface modification, silica as the metalloid oxide and potassium as the dopant. Further, in considering the propriety of the prima facie case, the unexpected results should be considered. The relevancy of the patents cited by the Examiner relative to his view of the unexpected nature of the results achieved is discussed above.

Since a proper prima facie case has not been established or is rebutted, considering the evidence provided within the specification and/or Rule 132 declaration, withdrawal of the rejection is respectfully requested.

### CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Therefore, it is respectfully requested that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. 1.136(a), and any fees required therefor are hereby authorized to be charged to **Deposit Account No. 02-4300, Attorney Docket No. 032301.606.**

Respectfully submitted,

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